

WHAT IS CLAIMED IS:

- 1           1.       A vascular prosthesis comprising:  
2                   an expandible structure which is implantable within a body lumen; and  
3                   means on or within the structure for releasing methylprednisolone into the  
4                   body lumen to inhibit smooth muscle cell proliferation.
- 1           2.       A prosthesis as in claim 1, wherein methylprednisolone is released at a  
2                   rate between 5  $\mu\text{g}/\text{day}$  to 200  $\mu\text{g}/\text{day}$ .
- 1           3.       A prosthesis as in claim 1, wherein methylprednisolone is released at a  
2                   rate between 10  $\mu\text{g}/\text{day}$  to 60  $\mu\text{g}/\text{day}$ .
- 1           4.       A prosthesis as in claim 1, wherein methylprednisolone is released at  
2                   an initial phase wherein a rate of methylprednisolone release is between 0  $\mu\text{g}/\text{day}$  to 50  
3                    $\mu\text{g}/\text{day}$  and a subsequent phase wherein a rate of methylprednisolone release is between 5  
4                    $\mu\text{g}/\text{day}$  to 200  $\mu\text{g}/\text{day}$ .
- 1           5.       A prosthesis as in claim 1, wherein methylprednisolone is released at  
2                   an initial phase wherein a rate of methylprednisolone release is between 5  $\mu\text{g}/\text{day}$  to 30  
3                    $\mu\text{g}/\text{day}$  and a subsequent phase wherein a rate of methylprednisolone release is between 10  
4                    $\mu\text{g}/\text{day}$  to 100  $\mu\text{g}/\text{day}$ .
- 1           6.       A prosthesis as in claim 1, wherein methylprednisolone is released at  
2                   an initial phase wherein a rate of methylprednisolone release is between 40  $\mu\text{g}/\text{day}$  to 300  
3                    $\mu\text{g}/\text{day}$  and a subsequent phase wherein a rate of methylprednisolone release is between 1  
4                    $\mu\text{g}/\text{day}$  to 100  $\mu\text{g}/\text{day}$ .
- 1           7.       A prosthesis as in claim 1, wherein methylprednisolone is released at  
2                   an initial phase wherein a rate of methylprednisolone release is between 40  $\mu\text{g}/\text{day}$  to 200  
3                    $\mu\text{g}/\text{day}$  and a subsequent phase wherein a rate of methylprednisolone release is between 10  
4                    $\mu\text{g}/\text{day}$  to 40  $\mu\text{g}/\text{day}$ .
- 1           8.       A prosthesis as in claim 1, wherein methylprednisolone is released at a  
2                   constant rate between 5  $\mu\text{g}/\text{day}$  to 200  $\mu\text{g}/\text{day}$ .
- 1           9.       A prosthesis as in claim 1, wherein a total amount of  
2                   methylprednisolone release is in a range from 100  $\mu\text{g}$  to 10 mg.

1                   10. A prosthesis as in claim 1, wherein a total amount of  
2 methylprednisolone release is in a range from 300  $\mu$ g to 2 mg.

1                   11. A prosthesis as in claim 1, wherein a total amount of  
2 methylprednisolone release is in a range from 500  $\mu$ g to 1.5 mg.

1                   12. A prosthesis as in claim 1, wherein a mammalian tissue concentration  
2 of methylprednisolone at an initial phase is within a range from 0  $\mu$ g/mg of tissue to 100  
3  $\mu$ g/mg of tissue.

1                   13. A prosthesis as in claim 1, wherein a mammalian tissue concentration  
2 of methylprednisolone at an initial phase is within a range from 0  $\mu$ g/mg of tissue to 10  
3  $\mu$ g/mg of tissue.

1                   14. A prosthesis as in claim 1, wherein a mammalian tissue concentration  
2 of methylprednisolone at a subsequent phase is within a range from 1 picogram/mg of tissue  
3 to 100  $\mu$ g/mg of tissue.

1                   15. A prosthesis as in claim 1, wherein a mammalian tissue concentration  
2 of methylprednisolone at a subsequent phase is within a range from 1 nanogram/mg of tissue  
3 to 10  $\mu$ g/mg of tissue.

1                   16. A prosthesis as in claim 1, wherein the expansible structure is a stent or  
2 graft.

1                   17. A prosthesis as in claim 1, wherein the means for releasing  
2 methylprednisolone comprises a matrix formed over at least a portion of the structure.

1                   18. A prosthesis as in claim 17, wherein the matrix is composed of a  
2 material which undergoes degradation.

1                   19. A prosthesis as in claim 17, wherein the matrix is composed of a  
2 nondegradable material.

1                   20. A prosthesis as in claim 19, wherein methylprednisolone is released by  
2 diffusion through the nondegradable matrix.

1                   21. A prosthesis as in claim 17, wherein the matrix comprises multiple  
2 layers, wherein at least one layer contains methylprednisolone and another layer contains  
3 methylprednisolone, at least one substance other than methylprednisolone, or no substance.

1                   22. A prosthesis as in claim 21, wherein the at least one substance other  
2 than methylprednisolone is an immunosuppressive substance selected from the group  
3 consisting of rapamycin, mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506,  
4 zafurin, and methotrexate.

1                   23. A prosthesis as in claim 21, wherein the at least one substance other  
2 than methylprednisolone is an agent selected from the group consisting of anti-platelet agent,  
3 anti-thrombotic agent, and IIb/IIIa agent.

1                   24. A prosthesis as in claim 1, wherein the means for releasing  
2 methylprednisolone comprises a rate limiting barrier formed over at least a portion of the  
3 structure.

1                   25. A prosthesis as in claim 24, wherein methylprednisolone is released by  
2 diffusion through the rate limiting barrier.

1                   26. A prosthesis as in claim 1, wherein the means for releasing  
2 methylprednisolone comprises a reservoir on or within the structure containing  
3 methylprednisolone and a cover over the reservoir.

1                   27. A prosthesis as in claim 1, wherein methylprednisolone is on or within  
2 the expandable structure.

1                   28. A prosthesis as in claim 1, wherein methylprednisolone is disposed  
2 within a matrix or rate limiting membrane.

1                   29. A vascular prosthesis comprising:  
2                   an expandable structure implantable within a body lumen; and  
3                   a rate limiting barrier on the structure for releasing methylprednisolone into  
4 the body lumen to inhibit smooth muscle cell proliferation;  
5                   wherein the barrier comprises multiple layers, each layer comprising parylast  
6 or paralene and having a thickness in a range from 50 nm to 10 microns.

1                   30.    A prosthesis as in claim 29, wherein methylprednisolone is released at  
2 a rate between 5 µg/day to 200 µg/day.

1                   31.    A prosthesis as in claim 29, wherein methylprednisolone is released at  
2 a rate between 10 µg/day to 60 µg/day.

1                   32.    A prosthesis as in claim 29, wherein at least one layer contains  
2 methylprednisolone and another layer contains methylprednisolone, at least one substance  
3 other than methylprednisolone, or no substance.

1                   33.    A vascular prosthesis comprising:  
2                   an expandible structure;  
3                   a source of methylprednisolone on or within the structure, wherein the  
4 methylprednisolone is released from the source when the expandible structure is implanted in  
5 a blood vessel; and  
6                   a source of at least one other substance in addition to methylprednisolone on  
7 or within the structure, wherein the at least one additional substance is released from the  
8 source when the expandible structure is implanted in a blood vessel.

1                   34.    A prosthesis as in claim 33, wherein the at least one additional  
2 substance is an immunosuppressive substance selected from the group consisting of  
3 rapamycin, mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506, zafurin, and  
4 methotrexate.

1                   35.    A prosthesis as in claim 33, wherein the at least one additional  
2 substance comprises at least one agent selected from the group consisting of anti-platelet  
3 agent, anti-thrombotic agent, and IIb/IIIa agent.

1                   36.    A prosthesis as in claim 33, wherein each source comprises a matrix,  
2 rate limiting membrane, or reservoir.

1                   37.    A method for inhibiting restenosis in a blood vessel following  
2 recanalization of the blood vessel, said method comprising:  
3                   implanting a vascular prosthesis in the blood vessel; and  
4                   releasing methylprednisolone into the blood vessel so as to inhibit smooth  
5 muscle cell proliferation.

1                   38.    A method as in claim 37, wherein methylprednisolone is released at a  
2   rate between 5 µg/day to 200 µg/day.

1                   39.    A method as in claim 37, wherein methylprednisolone is released at a  
2   rate between 10 µg/day to 60 µg/day.

1                   40.    A method as in claim 37, wherein methylprednisolone is released  
2   within a time period of 1 day to 45 days in a vascular environment.

1                   41.    A method as in claim 37, wherein methylprednisolone is released  
2   within a time period of 7 days to 21 days in a vascular environment.

1                   42.    A method as in claim 37, further comprising releasing at least one  
2   other substance in addition to methylprednisolone simultaneously with methylprednisolone  
3   release.

1                   43.    A method as in claim 37, further comprising releasing at least one  
2   other substance in addition to methylprednisolone sequentially with methylprednisolone  
3   release.

1                   44.    A method as in claim 42 or 43, wherein the at least one additional  
2   substance is an immunosuppressive substance selected from the group consisting of  
3   rapamycin, mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506, zafurin, and  
4   methotrexate.

1                   45.    A method as in claim 37, wherein the releasing comprises delaying  
2   substantial release of methylprednisolone for at least one hour following implantation of the  
3   prosthesis.

1                   46.    A method as in claim 45, wherein delaying release comprises slowing  
2   release from a reservoir with a material that at least partially degrades in a vascular  
3   environment over said one hour.

1                   47.    A method as in claim 45, wherein delaying release comprises slowing  
2   release with a matrix that at least partially degrades in a vascular environment over said one  
3   hour.

1                   48. A method as in claim 45, wherein delaying release comprises slowing  
2 release with a nondegradable matrix that allows diffusion of methylprednisolone through the  
3 nondegradable matrix after said one hour.

1                   49. A method as in claim 45, wherein delaying release comprises slowing  
2 release with a rate limiting barrier that allows diffusion of methylprednisolone through the  
3 barrier after said one hour.

1                   50. A method as in any one of claims 47-49, wherein the prosthesis is  
2 coated with the matrix or barrier by spraying, dipping, deposition, or painting.

1                   51. A method as in claim 37, wherein the prosthesis incorporates  
2 methylprednisolone by coating, spraying, dipping, deposition, chemical bonding, or painting  
3 methylprednisolone on the prosthesis.

1                   52. A method for inhibiting restenosis in a blood vessel following  
2 recanalization of the blood vessel, said method comprising:

3                   implanting a vascular prosthesis in the blood vessel; and  
4                   releasing methylprednisolone and at least one other substance in addition to  
5 methylprednisolone from the prosthesis when implanted in the blood vessel.

1                   53. A method as in claim 52, wherein the at least one additional substance  
2 is an immunosuppressive substance selected from the group consisting of rapamycin,  
3 mycophenolic acid, riboflavin, tiazofurin, mizoribine, FK 506, zafurin, and methotrexate.

1                   54. A method as in claim 53, wherein the immunosuppressive substance is  
2 mycophenolic acid.

1                   55. A method as in claim 53, wherein the immunosuppressive substance is  
2 mizoribine.

1                   56. A method as in claim 52, wherein methylprednisolone is released  
2 within a time period of 2 days to 3 months.

1                   57. A method as in claim 52, wherein the at least one additional substance  
2 comprises at least one agent selected from the group consisting of anti-platelet agent, anti-  
3 thrombotic agent, and IIb/IIIa agent.

1                   58.     A method as in claim 52, wherein methylprednisolone and the at least  
2     one additional substance are released simultaneously.

1                   59.     A method as in claim 52, wherein methylprednisolone and the at least  
2     one additional substance are released sequentially.